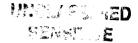
Document ID: EDF-2973 Revision ID:0



# QA RECORD Engineering Design File

PROJECT FILE NO. 015722

## INTEC Tank Farm Tank Closure Grouping Evaluation

Prepared for: U.S. Department of Energy Idaho Operations Office Idaho Falls, Idaho



#### **ENGINEERING DESIGN FILE**

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1. Title: INT	EC Tank	Farm Tank Closure Grouting E	valuation	
2. Project File	e No.: (	15722		
3. Site Area	and Build	ling No.: INTEC TFF 4. SS	C Identification/Equipment Tag I	Vo.:
<ol> <li>Summary: This EDF tanks, and</li> </ol>	evaluates piping a tion limits	s the grouting to be used to stab nd determines the volume of gro s specified in 10 CFR 61.55. Info	ilize potential residual waste in li out necessary to comply with the	NTEC Tank Farm Class C LLW
		proval (A) and Acceptance (Ac) or definitions of terms and signific		
	R/A	Typed Name/Organization	Signature	Date
Performer		Randy Eastman/ Facilities Design	Randy Easter	11-14-01
Checker	R			
Independent Peer Reviewe	A	Dan Staiger	Dein Starger	19 NOV 01
Approver	Α		0	
Requestor	Ac	Baird McNaught/Project Management Fuel/Waste Management	W. Bire Myl	Lit 19 NOV.01
1,000				,
7. Distribution		BAIRD McNaught, M	5 3211 ,' PAN STAIGER, N	15 3211
		ent Uniform File Code (UFC):	8 <del>204</del> 8302	
		ty: DC A17-30-C-1	Retention Period: SEE T	Mcs
		RC licensed facility or INEEL SN		lo
9. Registered	d Profess	ional Engineer's Stamp (if requi	red)	

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#### 1.0 Introduction

The purpose of this EDF is to determine if the grouting that will be used to stabilize residual waste in the INTEC Tank Farm (TFF) eleven 300,000 gal underground storage tanks, four 30,000 gal storage tanks, and associated process piping will meet Class C LLW concentration limits per 10 CFR Part 61. The grout thickness necessary to stabilize the residual waste will be determined using volume averaging techniques as presented in the Department of Energy, Radioactive Waste Management Technical Position Paper titled "Concentration Averaging and Encapsulation Related to Requirements for the Waste Incidental to Reprocessing Determinations of DOE M 435.1-1, Section II.B.(2)" (Reference 1). Information from various references will be used to form the basis of the analysis presented in this EDF.

Waste classification for near surface disposal is described in 10 CFR 61.55, "Waste Classification." The NRC concentration limits in 10 CFR 61.55 are for classification of waste as a particular type (Class A, B, C, or Greater Than Class C (GTCC)). The classification scheme from 10 CFR 61.55 is provided below:

#### 2.0 10 CFR 61.55 Waste Classification

- (a) Classification of waste for near surface disposal. (1) Considerations. Determination of the classification of radioactive waste involves two considerations. First, consideration must be given to the concentration of long-lived radionuclides (and their shorter-lived precursors) whose potential hazard will persist long after such precautions as institutional controls, improved waste form, and deeper disposal have ceased to be effective. These precautions delay the time when long-lived radionuclides could cause exposures. In addition, the magnitude of the potential dose is limited by the concentration and availability of the radionuclide at the time of exposure. Second, consideration must be given to the concentration of shorter-lived radionuclides for which requirements on institutional controls, waste form, and disposal methods are effective.
- (2) Classes of waste. (i) Class A waste is waste that is usually segregated from other waste classes at the disposal site. The physical form and characteristics of Class A waste must meet the minimum requirements set forth in §61.56(a). If Class A waste also meets the stability requirements set forth in §61.56(b), it is not necessary to segregate the waste for disposal.
- (ii) Class B waste is waste that must meet more rigorous requirements on waste form to ensure stability after disposal. The physical form and characteristics of Class B waste must meet both the minimum and stability requirements set forth in §61.56.
- (iii) Class C waste is waste that not only must meet more rigorous requirements on waste form to ensure stability but also requires additional measures at the disposal facility to protect against inadvertent intrusion. The physical form and characteristics of Class C waste must meet both the minimum and stability requirements set forth in §61.56.
- (iv) Waste that is not generally acceptable for near-surface disposal is waste for which form and disposal methods must be different, and in general more stringent, than those specified for Class C waste. In the absence of specific requirements in this part, such waste must be disposed of in a geologic repository as defined in part 60 of this chapter unless proposals for disposal of such waste in a disposal site licensed pursuant to this part are approved by the Commission.
- (3) Classification determined by long-lived radionuclides. If radioactive waste contains only radionuclides listed in Table 1, classification shall be determined as follows:

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- (i) If the concentration does not exceed 0.1 times the value in Table 1, the waste is Class A.
- (ii) If the concentration exceeds 0.1 times the value in Table 1 but does not exceed the value in Table 1, the waste is Class C.
- (iii) If the concentration exceeds the value in Table 1, the waste is not generally acceptable for near-surface disposal.
- (iv) For wastes containing mixtures of radionuclides listed in Table 1, the total concentration shall be determined by the sum of fractions

Table 1 from 10 C	FR 61.55
Radionuclide	Concentration curies per cubic meter
C-14	8
C-14 in activated metal	80
Ni-59 in activated metal	220
Nb-94 in activated metal	0.2
Tc-99	3
I-129	80.0
Alpha emitting transuranic nuclides with half-life greater than 5 years	<sup>1</sup> 100
Pu-241	13,500
Cm-242	<sup>1</sup> 20,000

<sup>1</sup>Units are nanocuries per gram.

- (4) Classification determined by short-lived radionuclides. If radioactive waste does not contain any of the radionuclides listed in Table 1, classification shall be determined based on the concentrations shown in Table 2. However, as specified in paragraph (a)(6) of this section, if radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.
- (i) If the concentration does not exceed the value in Column 1, the waste is Class A.
- (ii) If the concentration exceeds the value in Column 1, but does not exceed the value in Column 2, the waste is Class B.
- (iii) If the concentration exceeds the value in Column 2, but does not exceed the value in Column 3, the waste is Class C.
- (iv) If the concentration exceeds the value in Column 3, the waste is not generally acceptable for near-surface disposal.
- (v) For wastes containing mixtures of the nuclides listed in Table 2, the total concentration shall be determined by the sum of fractions rule

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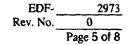
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Table 2 from 10 CFR	61.55		
Radionuclide		centration or cubic n	•
Radionuciae	Col.	Col. 2	Coi. 3
Total of all nuclides with less than 5 year half-life	700	(¹)	( <sup>1</sup> )
H-3	40	(')	(¹)
Co-60	700	(1)	(')
Ni-63	3.5	70	700
Ni-63 in activated metal	35	700	7000
Sr-90	0.04	150	7000
Cs-137	1	44	4600

<sup>&</sup>lt;sup>1</sup> There are no limits established for these radionuclides in Class B or C wastes. Practical considerations such as the effects of external radiation and internal heat generation on transportation, handling, and disposal will limit the concentrations for these wastes. These wastes shall be Class B unless the concentrations of other nuclides in Table 2 determine the waste to the Class C independent of these nuclides.

- (5) Classification determined by both long- and short-lived radionuclides. If radioactive waste contains a mixture of radionuclides, some of which are listed in Table 1, and some of which are listed in Table 2, classification shall be determined as follows:
- (i) If the concentration of a nuclide listed in Table 1 does not exceed 0.1 times the value listed in Table 1, the class shall be that determined by the concentration of nuclides listed in Table 2.
- (ii) If the concentration of a nuclide listed in Table 1 exceeds 0.1 times the value listed in Table 1 but does not exceed the value in Table 1, the waste shall be Class C, provided the concentration of nuclides listed in Table 2 does not exceed the value shown in Column 3 of Table 2.
- (6) Classification of wastes with radionuclides other than those listed in Tables 1 and 2. If radioactive waste does not contain any nuclides listed in either Table 1 or 2, it is Class A.
- (7) The sum of the fractions rule for mixtures of radionuclides. For determining classification for waste that contains a mixture of radionuclides, it is necessary to determine the sum of fractions by dividing each nuclide's concentration by the appropriate limit and adding the resulting values. The appropriate limits must all be taken from the same column of the same table. The sum of the fractions for the column must be less than 1.0 if the waste class is to be determined by that column. Example: A waste contains Sr-90 in a concentration of 50 Ci/m³. and Cs-137 in a concentration of 22 Ci/m³. Since the concentrations both exceed the values in Column 1, Table 2, they must be compared to Column 2 values. For Sr-90 fraction 50/150=0.33; for Cs-137 fraction, 22/44=0.5; the sum of the fractions=0.83. Since the sum is less than 1.0, the waste is Class B.
- (8) Determination of concentrations in wastes. The concentration of a radionuclide may be determined by indirect methods such as use of scaling factors which relate the inferred concentration of one radionuclide to another that is measured, or radionuclide material accountability, if there is reasonable assurance that the indirect methods can be correlated with actual measurements. The concentration of a radionuclide may be averaged over the volume of the waste, or weight of the waste if the units are expressed as nanocuries per gram.

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#### 3.0 Basis of Analysis

Assumptions used in the calculations presented in this EDF are the following:

- 1. All 300,000 gal underground storage tanks are 50 ft in diameter (As-built drawings)
- 2. The grout specific gravity is 2.1 (Reference 6)
- 3. The 300,000 gallon tank heel consists of 27% solids and 73% liquids (Reference 5, Section 2.3).
- 4. The vertical walls of the 300,000 gal storage tanks have a residual waste thickness of 1/8" after cleaning.
- 5. The 30,000 gal storage tank walls have a residual waste thickness of 2 mils after cleaning.
- 6. The piping has a residual waste thickness of 2 mils after cleaning.
- 7. The bounding radionuclide inventory for the 300,000 gal storage tank 1" heel will be used as the basis to determine the residual waste inventory for the 300,000 gal tank walls, 30,000 gal tank walls, and the piping. The residual inventory for the 300,000 gal tank walls will be determined by dividing the wall residual volume by the 300,000 gal tank heel volume and multiplying this fraction times the 300,000 gal tank heel inventory. The residual inventory for the 30,000 gal tanks and the piping will be determined using the same approach.
- 8. The bounding radionuclide inventory for the heel in the 300,000 gal underground storage tanks is as defined in the Performance Assessment report for the TFF (Reference 5) modified by updated inventory data provided by Portage, Inc. (October 2001). See Table 9 within this EDF.
- After all cleaning has been performed, the heel thickness will be 1" in the 300,000 gallon storage tanks.

#### 4.0 Discussion of Calculations and Results

#### 300,000 Gal Underground Storage Tank Grouting

One of the final steps in the closure of the 300,000 gal underground storage tanks will be to install grout in the tanks to stabilize and solidify any remaining waste. Prior to grouting, washing and cleaning of the storage tanks will be performed to reduce the tank overall internal contamination. A steam jet pump will be used to remove as much heel as possible during washing operations. As stated above it will be assumed that the heel can be drawn down to a thickness of 1" above the bottom of the tank. Prior to grouting this assumption will be verified by confirmatory samples.

Grout will be installed in the tanks in accordance with the results of the full-scale grout mockup test (See Reference 3). The grout mockup test successfully proved that the heel could be reduced by installing grout in five separate pours in specific patterns to push the heel toward the jet pump suction. Although this method of grout installation will result in a reduction of the heel, no credit will be taken in this analysis for the additional heel removal in determining the volume of grout required to meet Class C LLW concentration limits.

After the installation of the grout in the five pour sequence, a sixth pour will be placed to cover the previous five pours to fill remaining voids and cap and further stabilize the residual waste. The nominal thickness of the initial five pours, based on the mockup testing, was about 18 inches representing approximately 110 cu yards of grout. Each foot of tank depth represents approximately 73 cu yards of volume. The sixth pour or cap will add at least another 225 cu yards of grout for a total grout depth for the six pours of about 3.1 ft. With a total of 3.1 ft of grout and a bounding inventory for a 1" heel, the Class C LLW limits will be met (See Tables 1 & 2 with this EDF).

Table 1 identifies the parameters used to determine the total volume of residual waste and grout. Table 2 calculates the Class C LLW values based on the Table 9 bounding inventory for a 1" heel and Table 1 values and then compares these values against the Class C LLW concentration limits. The Sum of the

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Fraction numbers shown in Table 2 must be less than 1 for both the short-life and long-life radionuclides to comply with the Class C LLW concentration limits.

#### 300,000 Gal Underground Storage Tank Wall Residual Waste Grouting

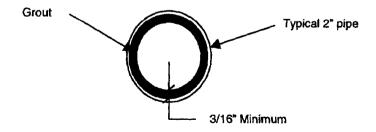
In addition to the heel in the bottom of the 300,000 gallon storage tanks, some residual contamination may remain adhered to the tank walls even after cleaning has occurred. The residual contamination will be assumed to be 1/8" thick covering the inner vertical tank walls. (See Table 3). The tank wall cleanliness and any residual waste will be verified prior to tank grouting. Table 4 shows that if 12 inches of grout covers the inner wall surface, then a layer of up to 1/8" of residual contamination (based on the volume fraction of the 1" heel bounding waste inventory) can remain and the Class C LLW concentration limits will be met. When the tank is fully grouted, the residual contamination will be encapsulated between the tank wall and the grout.

#### 30,000 Gal Storage Tank Grouting

The INTEC Tank Farm also contains four 30,000 gallon, horizontal storage tanks. Each tank has been assumed to have a residual waste layer of 2 mils thickness. Each tank has a diameter of 11.5 feet and is approximately 38 ft long. Assuming flat plate heads, the inner surface area is approximately 1,581 sq ft. Assuming a 2 mil (0.002 inches) contamination thickness over the entire inner surface, the total residual would be approximately 0.26 cu. ft (See Table 5). Based on these assumptions and the volume fraction of the 1" heel bounding inventory, if at least 3/16 inch of grout covers the inner tank wall, then Class C LLW concentration limits will be met as shown in Table 6. When the tank is fully filled with grout, the residual contamination will be encapsulated between the tank wall and the grout.

#### **Piping**

EDF-015722-039 estimates the total length of process lines associated with the tank farm to be 10,600 feet. This EDF also estimated the residual waste as 0.002 inch thickness on the interior surface of the pipe which represented approximately 60 kg mass. To obtain 60 kg of residual waste, 10,300 sq ft of piping inner surface area was assumed at 0.002 inches of residual waste thickness (See Table 7). Based on these assumptions and the volume fraction of the 1" heel bounding inventory, if at least 3/16 inch of grout thickness covers the piping wall, the grout will adequately stabilize the residual waste to comply with Class C LLW concentration limits as shown in Table 8. The diagram below shows a typical piping cross-section showing the ideal grout arrangement to comply with the Class C limits.



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#### REFERENCES

- 1. Department of Energy, Radioactive Waste Management Technical Position Paper "Concentration Averaging and Encapsulation Related to Requirements for the Waste Incidental to Reprocessing Determinations of DOE M435.1-1, Section II.B.(2)".
- 2. DOE/ID-10777, Idaho Nuclear Technology and Engineering Center Tank Farm Facility Residuals: Waste-Incidental-to Reprocessing Determination Report.
- 3. INEEL/EXT-99-01067, Idaho Nuclear Technology and Engineering Center Tank Farm Facility Closure TFF WM-182 Grout Mock-Up.
- 4. EDF-015722-039, INTEC Tank Farm Facility Closure, "Pipeline Decontamination Assessment", prepared by Mike Wilcox.
- 5. INEEL/EXT-2001-XX, Performance Assessment for the Tank Farm Facility at the Idaho National Engineering and Environmental Laboratory, April 2001.
- 6. EDF-1464, INTEC Tank Farm Closure, "Fill Grout" prepared by Scott A. Jensen.
- 7. Conceptual Design for the INTEC Tank Farm Facility Closure, Project File No. 015722, September 29, 2000.

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#### **APPENDIX**

Tabl 300,000 Gal Ta		ns
SG of Liquid	1.00	
Particle SG	1.88	
Area of Tank Bottom	1,963	tt^2
Residual Heel Thickness	1.0	in
Heel Volume	164	ft^3
Heel Volume	1,224	gal
Heel Volume	4,634	1
Liquid Fraction	73.1%	
Volume of Solids	1,247	1
Volume of Liquid	3,387	
Mass of Solids	2,343	kg
Mass of Liquid	3,387	kg
Grout SG	2.10	
Grout Depth	3.10	ft
Grout Mass	361,996	kg
Grout Volume	172,379	!
Grout Volume	225	9/
Total Mass	367,727	kg
Total Yolume	177,013	
CFR Classification	Class C	

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Colombination   Class C   Claim   Class E limit   Class C (laim)   Claim   Class C (laim)   Claim   Class C (laim)   Claim   Claim   Class C (laim)   Claim   Claim   Class C (laim)   Claim   Cla	Clum-3  Clum-3  Clum-3  Class A Limit Class B Limit Class C Limit Limit?				Table 2	- 300,000 Ga	al Territ Grou	Table 2 - 300,000 Gal Tank Grout LLW Analysis	.9				
Colum-2  Colum-3  C	CCMm-31         COLOMA 21         CAGES A LIMIT Class B Limit Class C Limit         Limit 2         Limit 2         Limit 2         Limit 2         Limit 3         TRUE	Ciass		Class A limit	Class & limit	Class C timit	Ground 1 money	Enertion of	1	Firm adding a	1000		
Addra Emitting (half life < than 6 years)	NA   0,0039263	Determination:		(Ci/m-13)	(C/m/3)	(CVm^3)	(Cl/m/3)	Close & I imit	Class B 1 kmit	Chee C Imit		Under Class B	Under Class C
Adyta Emitting (half life < thran 5 years)         700         n/a         n/a         0.033263         0.00009616         0         0         TRUE         TRUE         TRUE           Ch 60         143         n/a         n/a         n/a         n/a         0.00167         0.00009616         0         0         TRUE         TRUE         TRUE           Ch 60         143         n/a         n/a         0.0167         0.00001         0         0         1 TRUE         TRUE         TRUE           NH-63         n schwared metal         35         700         7000         0.021         0.0000         0         0         1 TRUE         TRUE           Co-137         n schwared metal         35         700         7000         28.0         0.637         0.0000         FALSE         TRUE           Co-137         n schwared metal         1         4         4600         28.0         1.333         0.099         0.000         7.000         7.000         0.000         0.000         7.000         0.000         0.000         7.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000         0.000	n/a         0         0         0         0         TRUE         TRUE         TRUE           n/a         0.0018263         0.0000361         0         0         TRUE         TRUE         TRUE           n/a         0.00167         0.000023         0.000030         0.000030         17RUE         TRUE           n/0         0.021         0.0061         0.00030         0.000030         17RUE         TRUE           n/0         0.022         1,305         0.348         0.00746         FALSE         TRUE           n/0         0.037         0.0000         TRUE         TRUE           n/0         0.000         0.0136         FALSE         FALSE           n/0         0.000         0.0242         FALSE         FALSE           n/0         0.000         0.0242         FALSE         FALSE           n/0         0.000         0.0242         FALSE         FALSE           n/0         0.000	short lived:									THE L		רושעי
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CG-60         CG-60         CG-60         TRUE	1.4   0.0039683   0.00009816   0   0   TRUE   TRU			•	!			,	,	>	<u> </u>	2	HOH
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C-14 C-14 activated metal metal be <1)  C-14 in activated metal be <1)  C-15 in activated metal be <1)  C-16 in activated metal be <1)  C-17 in activated metal be <1)  C-18 in activated metal be <1)  C-19 in activated metal be <1)  C-19 in activated metal be <1)  C-14 in activated metal be <1)  C-14 in activated metal be <1)  C-15 in activated metal be <1)  C-16 in activated metal be <1)  C-17 in activated metal be <1)  C-18 in activated metal be <1)  C-19 in activated metal be <1)  C-10 in activated activated metal be <1)  C-10 in activated activated metal be <1)  C-11 in activated metal be <1)  C-12 in activated metal be <1)  C-14 in activated metal be <1)  C-15 in activated metal be <1)  C-14 in activated metal be <1)  C-15 in activated be <1)  C-15 in activated metal be <1)  C-16 in activated activated metal be <1)  C-17 in activated be <1)  C-18 in activated activated metal be <1)  C-18 in activated activated metal be <1)  C-19 in activated activated metal be <1)  C-10 in activated activated metal be <1)  C-10 in activated activated activated metal be <1)  C-10 in activated acti	1,333		/01.00	-	4	4600	28.0	83	0.637	0.00609	FALSE	THE	T.
C-14 C-14 mactivated metal 68 0.8 8 0 0 0 0 TRUE TRUE TRUE Ni-69 0.00 0 0 TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE	8 0 0 0 0 TRUE TRUE  80 0 0 0 0 TRUE TRUE  220 0 0 0 0 TRUE TRUE  7.42 2.42 0.242 FALSE  9.0637 0.242 0.242 FALSE  7.85 0.0637 0.242 0.0242 FALSE  7.80 0.00033 0.0043 0.0043 1 0.0042 FALSE  20000 0.00431 0.0000216 0.0000216 TRUE  7.80 0.00431 0.0000216 0.0000216 TRUE		Sum of Fractions Number (should be <1)					1 333	8	0.000	CAI CO	100	
C-14         C-14 <th< td=""><td>8         0         0         0         TRUE         TRUE           20         0         0         0         TRUE         TRUE           220         0         0         0         TRUE         TRUE           0.2         0.0484         2.42         2.42         0.242         FALSE         FALSE           3         0.0687         0.212         0.0212         TRUE         TRUE         TRUE           100         69.3         0.00491         0.00491         0.00491         TRUE         TRUE           100         69.3         6.83         0.693         FALSE         FALSE           3500         46.8         0.142         0.142         TRUE         TRUE           20000         0.00431         0.000216         0.00000216         TRUE         TRUE           20000         0.00431         0.0000216         0.00000216         TRUE         TRUE           20000         0.00431         0.0000216         0.00000216         TRUE         TRUE</td><td>long lived:</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td><td>3000</td><td>DOU!</td><td>INCE</td></th<>	8         0         0         0         TRUE         TRUE           20         0         0         0         TRUE         TRUE           220         0         0         0         TRUE         TRUE           0.2         0.0484         2.42         2.42         0.242         FALSE         FALSE           3         0.0687         0.212         0.0212         TRUE         TRUE         TRUE           100         69.3         0.00491         0.00491         0.00491         TRUE         TRUE           100         69.3         6.83         0.693         FALSE         FALSE           3500         46.8         0.142         0.142         TRUE         TRUE           20000         0.00431         0.000216         0.00000216         TRUE         TRUE           20000         0.00431         0.0000216         0.00000216         TRUE         TRUE           20000         0.00431         0.0000216         0.00000216         TRUE         TRUE	long lived:								3	3000	DOU!	INCE
C-14 in activated motal         8         8         8         9         0         0         0         1 HUE         TRUE           N-59         10-50         0         0         0         0         0         1 HUE         TRUE	Second   Control   Contr		C-14	8	¢	a	•	•	•	•	i		
N+50 N+50 O 0 0 TRUE TRUE TRUE N+50 N+50 O 0 0 0 TRUE TRUE TRUE N+50 N+50 O 0 0 0 TRUE TRUE TRUE N+50 O 0 0 0 TRUE TRUE N+50 O 0 0 0 0 TRUE TRUE N+50 O 0 0 0 0 0 0 TRUE TRUE N+50 O 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	220		Crist in activated matel	? •	9 (	P ;	>	•	>	9		TRUE	E E
N-94	220         0         0         0         TRUE         TRUE         TRUE           0.2         0.0484         2.42         2.42         0.242         FALSE         FALSE           3         0.0687         0.212         0.0212         TRUE         TRUE         TRUE           0.08         0.000387         0.0491         0.00491         0.00491         TRUE         TRUE           100         69.3         6.93         6.83         0.693         FALSE         FALSE           3500         46.8         0.142         0.142         TRUE         TRUE         TRUE           20000         0.00431         0.0000216         0.0000216         TRUE         TRUE         TRUE           20000         0.00431         0.0000216         0.00000216         TRUE         TRUE         TRUE           8.71         9.71         0.97         FALSE         FALSE			•	20	8	0	0	0	0	TRUE	TRUE	TRIFE
NP-94	0.2 0.0484 2.42 2.42 0.242 FALSE FALSE 3 0.0637 0.212 0.212 TRUE TRUE TRUE 0.08 0.0000383 0.00491 0.00491 TRUE TRUE 100 6.33 6.83 0.683 FALSE FALSE 3500 48.8 0.142 0.142 0.0142 TRUE TRUE 20000 0.00431 0.0000216 0.0000216 TRUE TRUE 20000 0.00431 0.0000216 0.00000216 TRUE TRUE TRUE TRUE 19.71 9.71 0.077 FALSE		Balk	S	ឧ	8	0	٥	٥	C	T. S.	70.17	1 1
Tip-98   0.3   0.3   3   0.0837   0.212   0.212   TAUSE   TA	3 0.0637 0.212 0.212 0.0212 TRUE TRUE O.06 0.000383 0.00491 0.00491 0.000491 TRUE TRUE TRUE TRUE S.S. 0.69 FALSE FALSE S.S. 0.693 FALSE FALSE S.S. 0.0431 0.0000216 0.0000216 0.0000216 TRUE TRUE TRUE TRUE TRUE TRUE TRUE S.S. 0.042 TRUE TRUE TRUE TRUE S.S. 0.0431 0.0000216 0.00000216 0.00000216 TRUE TRUE TRUE S.S. 0.0431 0.0000216 0.00000216 0.00000216 TRUE TRUE S.S. 0.097 FALSE FALSE		The state of the s	9.52	0.02	0.0	0.0484	2 43	CPC	2000	14.4	10101	
H129 Alpha Emitting TRU (half life > 5 years)*** 0.008 0.008 0.000933 0.00491 0.000491 0.000491 TRUE TRUE Pu-241** Sum of Fractions Number (should be <1)	0.08 0.0053/ 0.212 0.212 0.0212 TRUE TRUE TRUE 10.08 0.0000333 0.00431 0.000431 TRUE TRUE TRUE 10.00431 0.000431 0.0000216 0.00000216 TRUE TRUE TRUE 20000 0.00431 0.0000216 0.00000216 TRUE TRUE TRUE TRUE 10.00000216 0.00000216 TRUE TRUE TRUE 10.00000216 TRUE 10.00000216 TRUE 10.00000216 TRUE 10.00000216 TRUE 10.00000216 TRUE 10.00000216 TRUE		75-98	0			1000		1	7.576	1	TALSE TALSE	HOE
Alpha Emitting TRU (half lile > 5 years)**         0.004         0.006         0.00491         0.00491         0.000491         TRUE         TRUE         TRUE         TRUE         TRUE         TRUE         TRUE         FALSE         TRUE         FALSE         FALSE <t< td=""><td>0.08 0.0000393 0.00491 0.00491 TRUE TRUE TRUE TRUE 100 0.00491 TRUE TRUE TRUE TRUE SAN 0.0040 0.042 TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE</td><td></td><td>1130</td><td>2</td><td>3</td><td>•</td><td>C.083/</td><td>212.0</td><td>0.212</td><td>0.0212</td><td>13.EE</td><td>TRUE</td><td>E E</td></t<>	0.08 0.0000393 0.00491 0.00491 TRUE TRUE TRUE TRUE 100 0.00491 TRUE TRUE TRUE TRUE SAN 0.0040 0.042 TRUE TRUE TRUE TRUE TRUE TRUE TRUE TRUE		1130	2	3	•	C.083/	212.0	0.212	0.0212	13.EE	TRUE	E E
Author Entiring I HU (har lile > 5 years)** 10 10 69.3 6.93 6.93 6.93 FALSE FALSE  Author Entire I Humber (should be <1) 2000 2000 0.00431 0.00000216 0.00000216 TRUE TRUE  Sum of Fractions Number (should be <1) 2000 2000 0.00431 0.00000216 0.00000216 TRUE  Sum of Fractions Number (should be <1) 2000 2000 0.00431 0.00000216 0.00000216 FALSE FALSE	100 69.3 6.93 6.83 0.693 FALSE FALSE 3500 46.8 0.142 0.142 0.0142 TRUE TRUE 20000 0.00431 0.00000216 0.00000216 TRUE TRUE 9.71 9.71 0.97 FALSE FALSE			0.008	0.008	80.0	0.0000393	0.00491	0.00491	0.000491		THE	五
Chr.242* Chr.242* Sum of Fractions Number (should be <1) 350 350 350 48.8 0.142 0.142 0.0142 TRUE TRUE TRUE Sum of Fractions Number (should be <1) 300 2000 2000 0.00431 0.00000216 0.00000216 TRUE TRUE Sum of Fractions Number (should be <1) 9.71 0.97 FALSE FALSE	3500 48.8 0.142 0.142 0.0142 TRUE TRUE TRUE 20000 0.00431 0.00000216 0.00000216 TRUE TRUE TRUE TRUE 9.71 0.71 0.07 FALSE FALSE		April Emiliang 1 HO (nair life > 5 years)**	2	5	\$	69.3	6.93		0.693	FALSE	FALSE	Tation
Cm:242* Cm:242* 2000 2000 2000 0.00431 0.00000216 0.00000216 TRUE TRUE Sum of Fractions Number (should be <1) 9.71 0.007 0.97 FALSE FALSE	20000 0.00431 0.00000216 0.00000216 TRUE TRUE TRUE 9.71 9.71 0.97 FALSE FALSE FALSE		FU-241	350	320	3500	49.8	0.142		0.0142	70.0	Ę	
Sum of Fractions Number (should be <1)  9.71 9.71 0.97 FALSE FALSE	9.71 9.71 0.97 FALSE FALSE		Cm-242*	2000	2000	20000	0.00431	0.0000016	000	9100000000	i i	200	2
ALSE TALSE	FALSE TALSE AMONG CANADA NA COST NA CO		Sum of Fractions Number (should be <1)					7		2000000	201		¥ .
	"upitiof nelintee amount Amount of the same and the same	units of nCVa						9.7	5	à	PALSE	FALSE	HOE.

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Table 3		
300,000 Gal Tan	k Wall Condi	tions
SG of Liquid	1.00	
Particle SG	1.88	
Area of Tank Wall	3,613	ft^2
Residual Thickness	0.125	in
Residual Volume	37.6	ft^3
Residual Volume	281.5	gal
Residual Volume	1065.8	
Liquid Fraction	73%	
Volume of Solids	286.7	1
Volume of Liquid	779.1	I
Mass of Solids	539.0	kg
Mass of Liquid	779.1	kg
Grout SG	2.10	
Grout Depth	1.0	ft
Grout Mass	214,862	kg
Grout Valume	102,315	. 1
Grout Volume	133,809	су
Total Mass	216,180	kg
Total Volume	103,381	1
<del></del>	<del>-}</del>	
CFR Classification	Class C	

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				35.39	I abre 4 - 300,000 Gal Jank Wall Grout I. W Analysis	AT LEW Annual	Vela				
Class		diam's a stanto	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1								
Determination:	Class C	(CVm^3) (CVm^3) (Cvm/3) (Cvm/3)		Cites of Half	Grout Layer	Fraction of	Fraction of Fraction of	Fraction of	Under Class A	Under Class B	Under Class C
short lived:			,		١		CIEST D LIMIT	CIERT C CITAL	Limit?	Lm#?	Limit?
	Apha Emitting (half life < than 5 years)	200	<b>8/0</b>	n)c	•	•	•	•		·	
			1		·	•	•	0	HE	TRUE	THUE
		₹ .	I/B	<b>.</b>	0.0015462	0.00003866	0	0	TRUE	TRUE	T G
	3	8	Z/8	r/a	0.0006	0.0000000	<	•		1	
	N-63	6	۶	5	900	1000			2	i Or	i i
	Ni-63 in activated matei		2 6	3 5	8	0.0024	0.00012	0.000012	E E	TEC.	TRUE
	08-35	8 8	3 :	3	0	0	0	0	E E	TRUE	TRUE
	Ce137	<b>3</b> '	95.	2000	20.6	514	0.137	0.00294	FALSE	TRUE	TRUE
	Curt of Canadiana Minata	-	2	4600	11.0	11	0.251	0.00240	FALSE	THE STATE OF	T T
	CLY OF LINCHOLDS MURIDER (Should be <1)					525	02.0	0.0053	EALOE	Toric	
DEATH BUGG								3	200	TOU.	HOE
	÷.	6	å	•	•	•					
_	C.14 in portionated motes	9 6	9		5	0	0	0	TE S	TECE.	TRUE
		90	∞	8	0	0	0	•	TRIFF	Ē	1
	70-12	81	8	28	•	•	•		į	1	100
	25-25	S	5		,	•	>	,	100	Ę	
	72.00	80.0	7	, ix	1810.0	0.35	0.95	0.095	TRUE	THUE	TACE.
	130	e i	63	m	0.0251	0.0	0.084	0.0084	TRUE	TRUE	TREE
	671 T	0.008	90.0	90.0	0.0000155	0.00193	0.00193	0.000193	7.17	T T	1 1
_	April Emitting I HU (natt (file > 5 years)"	₽	5	5	27.1	2.74	2.0		10141	1	1
	Pu-241*	350	S	9010			i ;	0.21	1076	TALSE TALSE	H CE
-	Cm.242*	3 6	8	360	9	9800	0.056	0.0066	TAGE T	E E	TRUE
	Sum of Franklane Mamber Johns de La	3	2000	20000	0.00169	0.00000084	0.00000064	0.000000084	TRUE	TRUE	THUE .
· units of nCl/a	The state of the s					3.80	3.80	0.38	FALSE	FALSE	TRUE
" units of nCi/g; ir	" units of nCi/g; includes Am-241, Am-248, Cm-244, Np-237, Pu-238, Pu-239, Bu 340, Bu 342	1236 Di. 230 B.	040 0.000								
	A										

Ta 30,000 Gal Ta	ble 5 ank Conditi	ons
SG of Liquid	1.00	
Particle SG	1.88	
Total Tank Wall Area	1581	ft^2
Residual Waste Thickness	0.002	in
Residual Waste Volume	0.26	ff^3
Residual Waste Volume	1,97	gal
Residual Waste Volume	7.46	1
Liquid Fraction	73%	
Volume of Solids	2.01	<del></del>
Volume of Liquid	5.45	1
Mass of Solids	3.79	kg
Mass of Liquid	5.45	kg
Grout SG	2.10	
Grout Depth	0.012	ft
Grout Mass	1,128	kg
Grout Volume	537	
Grout Volume	1	ΟY
Total Mass	1,137	kg
Total Volume	545	1
CFR Classification	Class C	

			Table	6 30 000 G	Table 6 30 000 Gal Tank Ground 1 W Amahan	W Anaha					
Class		Class A limit	Class B limit	Class A limit Class B limit Class C limit Grount aver	Grout? aver	Emetion of	Smelling of	Resembles of	10.00		
Determination:	Class C	(Ci/m^3)	(CVm^3)	(CVm^3)		Class A Limit	Class A Limit Class B Limit	Class C. Imit	Under Class A	Under Class B	Under Class C
short lived:					l				CATA	Limit	רשוני
	Apha Emitting (half life < than 5 years)	2002	5	200	•	•	•	•	!		
	H3				•		•	0	TAUE	TRUE	Ŧ
	Co-Su	7			0.0020546	0.00006138	0	0	THUE	TRUE	TRUE
	80	8		ν	0.00087	0.00000125	0	0	THE	THE STATE OF THE S	T C
	200	3.5	2		0.011	0.0032	0,00016	0.000016	T E	10.01	
	N-63 in activated metal	38	8	2007	٥	C			Total	1	
	06-is	2	4			` ;		•		102	HOE
	Cs137	•	3		27.3	88		0.00390	FALSE	THE ST	TAUE
	Sim of Frankone Mumber (sherife be at		\$	4800	14.7	2		0.00319	FALSE	THUE	TRUE
long liber.	TO BOTH WOUNDER CALOUR DE CAL					698	0.52	12000	FALSE	THE	10.ET
										121	
	<b>*</b>	0.8	0.8	OC.	•	•	•	•	į	•	İ
	C-14 in activated metal	ď		S	•	•	> (	•	2	Ę	TRUE
	69°N	, 8	? {	8 8	>	3	•	0	E E	3	THE SE
	20.5	3 5	7	3	0.00010	0.0000044	0.000004	0.00000044	E E	TRUE	TRUE
	1.500	0.02	0.02	0.2	0.0253	1.27	1.27	0.127	FALSE	FALSE	THE
		0.3	0.3	m	0.0334	0.11	0.111	0.0111	<u>5</u>	TA IST	į
	F128	0.00	0.00	80.0	0.0000205	0.00257	0.00067	0.00057	Į į		ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב ב
	Alpha Emitting TRU (nati life > 5 years)**	2	£	8	8	100	0.000	0.0000	u !	2	
	Pu-241*	Vac.	2 6	3 8	9 8	0.0	5.0	0.361	FALSE	FALSE	Ę
	Cm.249*	8	C	900	9	0.074	9.074	0.0074	TRUE	TPUE	THUE
	The second second	0002	800	2000	0.00225	0.00000112	0.00000112	0.000000112	TRUE	TATE	Į,
Links of a City	Call of Precuons rumper (anough be <1)					90.5	90.9	284	241 66	70.00	

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Table 7 Piping Conditions					
SG of Liquid	1.00				
Particle SG	1.88	<del> </del>			
Estimated Pipe Surface Area	10300	940			
Residual Waste Thickness	0.002	#t^2			
Residual Waste Volume	1.7	#I			
Residual Waste Volume	13	gal			
Residual Waste Volume	49	- <del>ya</del> i			
Liquid Fraction	73%	<del></del>			
Volume of Solids	13				
Volume of Liquid	35	<del></del>			
Mass of Solids	25	kg			
Mass of Liquid	35	kg			
Grout SG	2.10	- Na			
Grout Depth	0.015	tt			
Grout Mass	9,188	kg			
Grout Volume	4,375	<u></u>			
Grout Volume	6	cy			
Total Mass	9,249	kg			
Total Volume	4,424	1			
CFR Classification	Class C				

Class Chief Link?         Class A timit Class B linit Class C timit Grout Layer         Fraction of Fraction of Fraction of Fraction of Fraction of Link?         Fraction of Fraction of Link?         Fraction of Link?         True				9								
Class C Limit Class E Minit Class E Minit Class E Minit Class C Limit Class E Limit Class C Limit Class E Minit Class C Limit Class C Limit Class C Limit Class E Limit Class C Limit							Francisco Ad	Eraction of	Fraction of	Under Class A	Under Class B	Under Class C
Agha Emitting (half life < flam 5 years)	•		Class A firmit	Class B limit C	(CVm^3)		Class A Limit	Class B Limit	Class C Limit	Limit?	Limit?	Limk?
Appra Emitting (half life < three flowers)         700         n/a		Cass C	,									!
Apprie Emitting (half life < than 5 years)         700         N/4         N/4         0.0016482         0.00004120         0         0         TRUE         TRUE         TRUE           H-3         140         n/a	of lived:					•	•	•	-	11 H	TRUE	THOSE I
H.3 Co-60 Nic. String charled metal Script Co-14 Nic. String charled metal Script Co-14 Sum of Fractions Number (should be <1) Sum of F		Alche Emillion (half life < then 5 years)	8		2,8	9		> 1	•	Ę	THIE	THUE
House   Hous		famous and a second sec	Ç.		n/a	0.0016482		0	•	ב ב		71101
Co-60         Thick control (Co-60)         Thick con		±3	₹ ¦		1	020000			0		¥ S	ב ב
NH-63 IN GS in activated metal         3.5         7/0         7/00         0,000         0		840	8		2	0.000	000000		5100000	7. E.	TRUE	E E
Ni-63 in activated metal   36   700   7000   21.9   548   0.146   0.00313   FALSE   TRUE		CC-12	3.5		200	0.009	O.W.Co	6.000		10.1	TRUE	THUE THE
Color   Colo		Mi 62 in authorized matel	35	,	7000	0		<b>.</b>	2 4		Ē	TRUE
CS137   CS13		MI-OS III ACIIVANDO MOLA	2		7000	21.9		0.146	D.00313			Į.
Sum of Fractions Number (ethould be <1)  Sum of Fractions Number (ethould be <		Sr-90	5		4600	2.0			0.00256	FALSE	HUE	LING
Sum of Fractions Number (ehould be )</th C-14           C-14         0.8         0.8         8         0         0         0         TRUE         TRUE         TRUE           C-14 in activated metal         22         24         102		Cs137	-		3				0 0057		TRUE	1
C-14 in activated metal 8 8 80 0 0 0 0 TRUE TRUE TRUE C-14 in activated metal 8 8 80 0.0000035 0.00000035 TRUE TRUE TRUE NI-59 0.000 0.0000035 0.00000035 0.00000035 TRUE TRUE TRUE NI-59 0.000 0.0000035 0.0000035 0.00000035 TRUE TRUE TRUE TRUE NI-59 0.000 0.00000035 0.00000035 0.00000035 TRUE TRUE TRUE TRUE NI-29 0.00000035 0.000000035 0.00000000000000							3					
C-14 and circulated motal mota	& Byed:					•	•	•	-	78.5	78C	THUE THE
8 8 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		45.0	0.8		•	•	•	•	•	Ē	a) lat	TRUE
2 22 22 220 0,0000035 0,0000035 0,00000033 TRUE ITRUE ITRUE 10.02 0.02 0.02 0.02 0.02 0.02 0.02 0.0		·			æ	٥	0	0	•	2	3 !!	į
22 22 22 10.0000 1.0000 1.000		C-14 in activated metal	•		3 8			0.000035	0.00000035		TRUE	Ę
102   0.02   0.02   0.0243   1.42   0.0259   0.0069   TRUE   TRUE   TRUE     1.42   0.0069   0.0069   TRUE   TRUE   TRUE   0.006   0.006   0.006   0.0060   0.0060   0.0060   TRUE   TRUE   TRUE   TRUE   0.006   0.006   0.006   0.0060   0.0060   TRUE   T		00-12	8		3	-	3	-		FALSE	FALSE	TRUE
6.3 6.3 3 0.0288 0.089 0.089 0.0000 TRUE TRUE TRUE (6.008 0.000 0.00000 TRUE TRUE TRUE (7.000 0.000 0.000 0.0000 0.0000 TRUE TRUE TRUE (7.000 0.000 0.000 0.000 0.0000 0.0000 TRUE TRUE TRUE TRUE (7.000 0.000 0.000 0.000000 0.000000 TRUE TRUE TRUE TRUE (4.00000000 0.00000000 0.0000000 TRUE TRUE TRUE (4.000 0.00000000 0.00000000 TRUE TRUE TRUE (4.000 0.00000000 0.00000000 TRUE TRUE TRUE TRUE (4.000000000 0.00000000 0.00000000 TRUE TRUE TRUE		76-47	0.0		0.2			30.1			TRIFF	TACE
		6 00 1	6.0		63		_		0.000		1000	Ď
Ming TRU (half life > 6 years)*** 10 100 28.9 2.89 2.89 0.289 FALSE FALSE FALSE (MING TRU (half life > 6 years)*** 2000 2000 0.00180 0.00000000 0.000000000 TRUE TRUE TRUE TRUE FALSE recidons Number (should be <1)		C-80	25		0.08	0		•	0.000206		2 1	
Hitting TRU (half life > 6 years)** 10 10 20 20 8 0.059 0.059 TRUE TRUE TRUE TRUE 2000 2000 20000 0.00189 0.00000090 0.000000000 TRUE TRUE TRUE TRUE RALSE FALSE FALSE FALSE		282	95.5		3				0.289	_	FALSE	5
350 3500 2000 0.00180 0.00000000 0.00000000 TRUE TRUE TRUE TRUE Incline Mumber (ehould be <1)		Alcha Emitting TRU (hatf life > 5 years)"	2		3				0.0050		TRUE	H
2000 2000 0.00180 0.0000000 0.00000000 0.00000000 0.000000		P-241*	350		3500			000	DECONOCIO		TRUE	THUE
ractions Number (should be <1)		Cm-242*	2000		20000	0.00180	0000	0.00	١		FALSE	TRUE
		ractions Number (should					8.					

30	Table 9 300,000 Gal Tank Heel Inventory					
	Units	Liquid in 1" Heel	Solids in 1" Heel	Total @1" Heel		
207 <sub>T</sub>	Ci	1.71 <b>E-</b> 06	5.73E-06	7.44E-06		
<sup>208</sup> Ti	Ci	2.06E-05	6.88E-05	8.94E-05		
<sup>209</sup> TI	Ci	2.51E-10	8.41E-10	1.09E-09		
<sup>209</sup> Pb	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>210</sup> Pb	Ci	1.71E-07	5.73E-07	7.44E-07		
<sup>211</sup> Pb	Ci	1.71E-06	5.73E-06	7.44E-06		
<sup>212</sup> Pb	Ci	5.94E-05	1.99E-04	2.58E-04		
<sup>214</sup> Pb	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>210m</sup> Bi	Ci	6.63E-21	2.22E-20	2.88E-20		
<sup>210</sup> Bi	· Ci	1.71 <b>E-</b> 07	5.73E-07	7.44E-07		
<sup>211</sup> Bi	Ci	1.71E-06	5.73E-06	7.44E-06		
<sup>212</sup> Bi	Ci	5.71E-05	1.91E-04	2.48E-04		
<sup>213</sup> Bi	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>214</sup> Bi	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>210</sup> Po	Ci	1.71E-07	5.73E-07	7.44 <b>E</b> -07		
<sup>211</sup> Po	Ci	•	*	*		
<sup>212</sup> Po	Ci	3.66E-05	1.22E-04	1.59E-04		
<sup>213</sup> Po	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>214</sup> Po	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>215</sup> Po	Ci	1.71E-06	5.73E-06	7,44E-06		
<sup>216</sup> Po	Ci	5.94E-05	1.99E-04	2.58E-04		
<sup>218</sup> Po	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>217</sup> At	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>219</sup> Rn	Çi	1.71E-06	5.73E-06	7.44E-06		
<sup>220</sup> Rn	Ci	5.94E-05	1.99E-04	2.58E-04		
<sup>222</sup> Rn	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>221</sup> Fr	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>223</sup> Fr	Ci	2.40E-08	8.03E-08	1.04E-07		
<sup>223</sup> Ra	Ci	1.71E-06	5.73E-06	7.44E-06		
<sup>224</sup> Ra	Ci	5.94E-05	1.99E-04	2.58E-04		
<sup>225</sup> Ra	Ci	1.14E-08	3.82E-08	4.96E-08		
<sup>226</sup> Ra	Ci	4.00E-07	1.34E-06	1.74E-06		
<sup>228</sup> Ra	Ci	2.06E-11	6.88E-11	1.74E-00 8.94E-11		
<sup>225</sup> Ac	Ci	1.14E-08	3.82E-08	6.94E-11 4.96E-08		
227Ac	Ci	1.71E-06	5.73E-06	4.96E-08 7.44E-06		
228Ac	Ci	2.06E-11	6.88E-11	7.44E-06 8.94E-11		
227 Th	Ci	1.71E-06	5.73E-06	7.44E-06		
228Th	Ci	5.94E-05	1.99E-04	2.58E-04		

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Table 9 (Cont'd) Bounding Tank Inventory					
	Units	Liquid in 1" Heel	Solids in 1" Heel	Total @1" Heel	
<sup>229</sup> Th	Ci	1.14E-08	3.82E-08	4.96E-08	
<sup>230</sup> Th	Ci	2.74E-05	9.18E-05	1.19E-04	
<sup>231</sup> Th	Ci	6.40E-04	2.14E-03	2.78E-03	
<sup>232</sup> Th	Ci	2.17E-11	7.26E-11	9.43E-11	
<sup>234</sup> Th	Ci	6.40 <b>E-04</b>	2.14E-03	2.78E-03	
<sup>231</sup> Pa	Ci	2.97E-06	9.94E-06	1.29E-05	
<sup>232</sup> Pa	Ci	8.91E-02	2.98E-01	3.87E-01	
<sup>234m</sup> Pa	Ci	6.40E-04	2.14E-03	2.78E-03	
<sup>234</sup> Pa	Ci	8.11E-07	2.71E-06	3.52E-06	
232 <sub>U</sub>	Cì	5.71E-05	1.91E-04	2.48E-04	
<sup>233</sup> U	Ci	7.43E-06	2.48E-05	3.22E-05	
<sup>234</sup> U	Ci	2.51E-02	8.41E-02	1.09E-01	
<sup>235</sup> U	Ci	1.20E-04	4.56E-04	5.76E-04	
<sup>236</sup> U	Ci	6.49 <b>E</b> -05	3.40E-03	3.46E-03	
<sup>237</sup> U	Ci	1.06E-04	3.56E-04	4.62E-04	
<sup>238</sup> U	Ci	1.64E-04	2.71E-04	4.35E-04	
<sup>240</sup> U	Ci	2.06E-11	6.88E-11	8.94E-11	
<sup>235</sup> <b>N</b> p	Ci	*	*	*	
<sup>236</sup> Np	Ci	*	*		
<sup>237</sup> Np	Ci	3.42E-03	6.58E-03	1.00E-02	
<sup>238</sup> Np	Ci	2.17E-06	7.26E-06	9.43E-06	
<sup>239</sup> Np	Ci	6.40E-04	2.14E-03	2.78E-03	
<sup>240m</sup> Np	Ci	2.06E-11	6.88E-11	8.94E-11	
<sup>236</sup> Pu	Ci	3.43E-06	1.15E-05	1.49E-05	
<sup>238</sup> Pu	Ci	5.69E+00	1.57E+01	2.14E+01	
<sup>239</sup> Pu	Ci	7.03E-01	9.96E-01	1.70E+00	
<sup>240</sup> Pu	Ci	3.20E-01	1.07E+00	1.39E+00	
<sup>241</sup> Pu	Ci	4.23E+00	1.41E+01	1.83E+01	
<sup>242</sup> Pu	Ci	2.40E-04	8.03E-04	1.04E-03	
<sup>243</sup> Pu	Ci	*	* .	*	
<sup>244</sup> Pu	Ci	2.06E-11	6.88E-11	8.94E-11	
<sup>241</sup> Am	Ci	3.59E-01	4.87E-01	8.46E-01	
<sup>242m</sup> Am	Ci	4.46E-04	1.49E-03	1.94E-03	
<sup>242</sup> Am	Cî	4.46E-04	1.49E-03	1.94E-03	
<sup>243</sup> Am	Cì	6.40E-04	2.14E-03	2.78E-03	
<sup>242</sup> Cm	Ci	3.66E-04	1.22E-03	1.59B-03	
<sup>243</sup> Cm	Ci	6.40E-04	2.14E-03	2.78E-03	
<sup>244</sup> Cm	Ci	3.20E-02	1.07E-01	1.39E-01	
<sup>245</sup> Cm	Ci	9.14E-06	3.06E-05	3.97E-05	

Table 9 (Cont'd) Bounding Tank Inventory					
	Units	Liquid in 1" Heel	Solids in 1" Heel	Total @1" Heel	
<sup>246</sup> Cm	Ci	5.94E-07	1.99E-06	2.58E-06	
<sup>247</sup> Cm	Ci	6.63E-13	2.22E-12	2.88E-12	
<sup>248</sup> Cm	Ci	7.20E-13	2.41E-12	3.13E-12	
<sup>249</sup> Cf	Ci	5.14E-13	1.72E-12	2.23E-12	
<sup>250</sup> Cf	Ci	2.17E-13	7.26E-13	9.43E-13	
<sup>251</sup> Cf	Ci	8.11E-15	2.71E-14	3.52E-14	
<sup>252</sup> Cf	Ci	*	*	*	
³H	Ci	1.60E-01	5.35E-01	6.95E-01	
<sup>10</sup> Be	Ci	9.14E-08	3.06E-07	3.97E-07	
<sup>14</sup> C	Ci	*	*	3.91E-07	
<sup>79</sup> Se	Ci	1.37E-02	4.59E-02	5.0CF 00	
81Kr	Ci	1.57E-02	4.376-02	5.96E-02 *	
<sup>85</sup> Kr		*	•	•	
<sup>87</sup> Rb	Ci		2.005.06	*	
90Sr	Ci	8.91E-07	2.98E-06	3.87E-06	
or 90 <b>Y</b>	Ci	8.13E+02	8.43E+03	9.24E+03	
93Zr	Ci	8.13E+02	8.43E+03	9.24E+03	
<sup>93m</sup> Nb	Çi O:	6.63E-02	2.22E-01	2.88E-01	
94	Ci	5.71E-02	1.91E-01	2.48E-01	
<sup>94</sup> Nb 98	Ci	3.43E-02	8.53E+00	8.56E+00	
<sup>98</sup> Tc ∞–	Ci	7.88 <b>E-</b> 08	2.64E-07	3.43E-07	
<sup>99</sup> Tc	Ci	8.83E-01	1.04E+01	1.13E+01	
<sup>106</sup> Ru	Ci	3.66E-06	1.22E-05	1.59E-05	
<sup>102</sup> Rh	Ci	1.14E-06	3.82E-06	4.96E-06	
<sup>106</sup> Rh	Cì	3.66E-06	1.22E-05	1.59E-05	
<sup>107</sup> Pd	Ci	4.91E-04	1.64E-03	2.13E-03	
<sup>108m</sup> Ag	Ci	1.26E-08	4.21E-08	5.47E-08	
108Aa	Ci	*	*	*	
<sup>109m</sup> Aa	Ci	*	*	*	
110mAg	Ci	*	*	•	
<sup>110</sup> Ag	Ci	*	*	*	
<sup>109</sup> Cd	Cì	*	*	*	
<sup>113m</sup> Cd	Ci	5.48E-02	1.84E-01	2.39E-01	
<sup>115</sup> ln	Ci	2.97E-12	9.94E-12	1.29E-11	
<sup>119m</sup> Sn	Ci	*	*	*	
<sup>121m</sup> Sn	Ci	1.71E-02	5.73E-02	7.44E-02	
<sup>126</sup> Sn	Ci	1.26E-02	4.10E-02	5.36E-02	
<sup>125</sup> Sb	Ci	1.49E-02	4.97E-02	6.46E-02	

Table 9 (Cont'd) Bounding Tank Inventory					
	Units	Liquid in 1" Heel	Solids in 1" Heel	Total @1" Heel	
<sup>126m</sup> Sb	Ci	1.26E-02	4.21E-02	5.47E-02	
<sup>126</sup> Sb	Ci	1.71E-03	5.73E-03	7.44E-03	
<sup>123</sup> Te	Ci	1.14E-14	3.82E-14	4.96E-14	
<sup>125m</sup> Te	Ci	3.77E-03	1.26E-02	1.64E-02	
129	Ci	1.60E-03	5.35E-03	6.95E-03	
<sup>134</sup> Cs	Ci	1.21E-02	5.24E-02	6.45E-02	
<sup>135</sup> Cs	Cì	2.74E-02	9.18E-02	1.19E-01	
<sup>137</sup> Cs	Ci	1.14E+03	3.82E+03	4.96E+03	
<sup>137m</sup> Ba	Ci	1.09E+03	3.63E+03	4.72E+03	
<sup>138</sup> La	Ci	5.94E-12	1.99E-11	2.58E-11	
<sup>142</sup> Ce	Ci	9.14E-07	3.06E-06	3.97E-06	
144Ce	Ċi	1.83E-07	6.12E-07	7.95E-07	
<sup>144m</sup> Pr	Ci	2.17E-09	7.26E-09	9.43E-09	
144Pr	Ci	1.83E-07	6.12E-07	7.95E-07	
<sup>144</sup> Nd	Cí	4.91E-11	1.64E-10	2.13E-10	
<sup>146</sup> Pm	Ci	2.97E-04	9.94E-04	1.29E-03	
<sup>147</sup> Pm	Ci	1.71E-01	5.73E-01	7.44E-01	
<sup>146</sup> Sm	Ci	8.45E-09	2.83E-08	3.68E-08	
<sup>147</sup> Sm	Ci	2.28E-07	7.65E-07	9.93E-07	
<sup>148</sup> Sm	Ci	1.14E-12	3.82E-12	4.96E-12	
<sup>149</sup> Sm	Ci	1.04E-13	3.48E-13	4.52E-13	
<sup>151</sup> Sm	Ci	9.37E+00	3.13E+01	4.07E+01	
<sup>150</sup> Eu	Ci	3.43E-07	1.15E-06	1.49E-06	
<sup>152</sup> Eu	Ci	4.00E-02	1.34E-01	1.74E-01	
<sup>154</sup> Eu	Ci	1.82E+00	3.34E-01	2.15E+00	
<sup>155</sup> Eu	Ci	2.25E-01	2.71E+00	2.94E+00	
<sup>152</sup> Gd	Ci	4.46E-14	1.49E-13	1.94E-13	
<sup>153</sup> Gd	Ci	*	*	*	
<sup>166m</sup> Ho	Cì	1.37E-06	4.59E-06	5.96E-06	
<sup>171</sup> Tm	Ci	1.37E-13	4.59E-13	5.96E-13	
<sup>59</sup> Ni	Ci	*	*	*	
<sup>55</sup> Fe	Ci	*	*	*	
<sup>60</sup> Co	Ci	1.39E-01	1.56E-01	2.95E-01	
<sup>63</sup> Ni	Ci	8.68E-01	2.91E+00	3.78E+00	

<sup>\*</sup> Estimates approximately zero

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2.	Document Date:	11/19/2001
3.	Document Title (or description):	INTEC Tank Farm Tank Closure Grouping Evaluation
4.	Addressee Name and Organization:	N/A
5.	Author Name and Organization:	Baird McNaught/BBWI
6.	Key Words:	evaluates the grouting to be used to stabilize potential residual waste in INTEC Tank Farm tanks, piping and determines the volume of grout necessary to comply with the Class C LLW concentration limits specified in 10 CFR 61.55, tank farm facility residual wir, QA record
		B
		6/18/2002
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